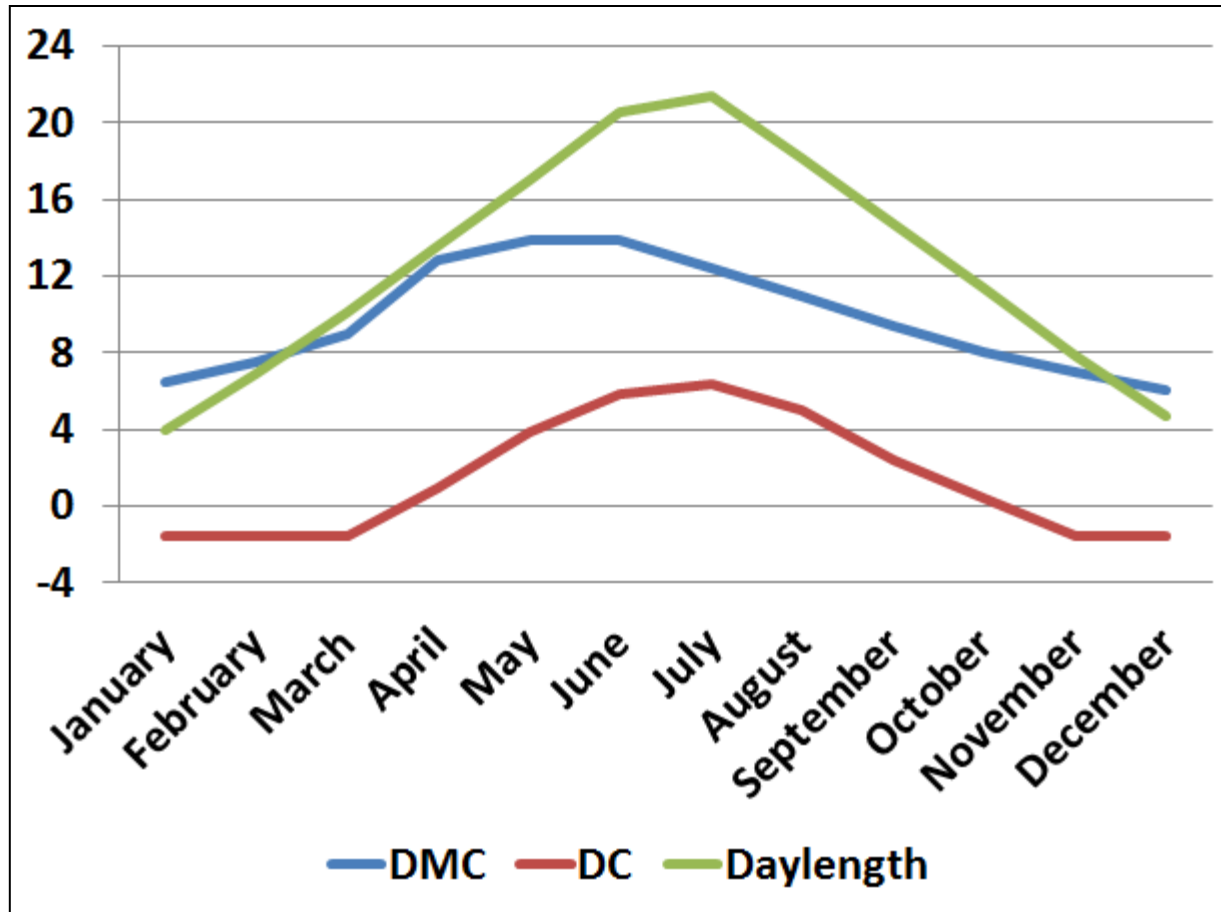


Seasonality and CFFDRS



Seasonality in FWI Inputs

(Daylength Factor in DMC and DC)

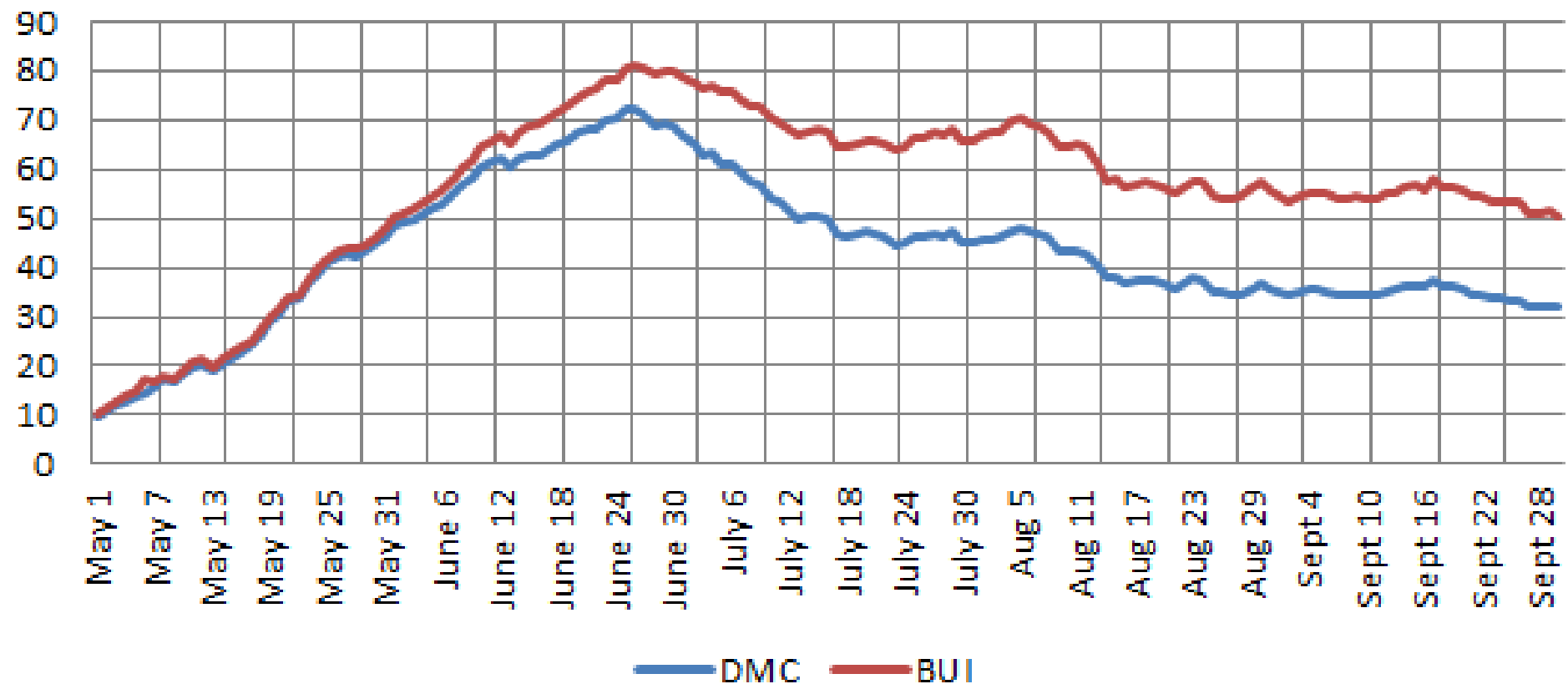


- No variation based on latitude
- Monthly values instead of daily variation

(Daylength for Fairbanks)

Seasonality in FWI Outputs

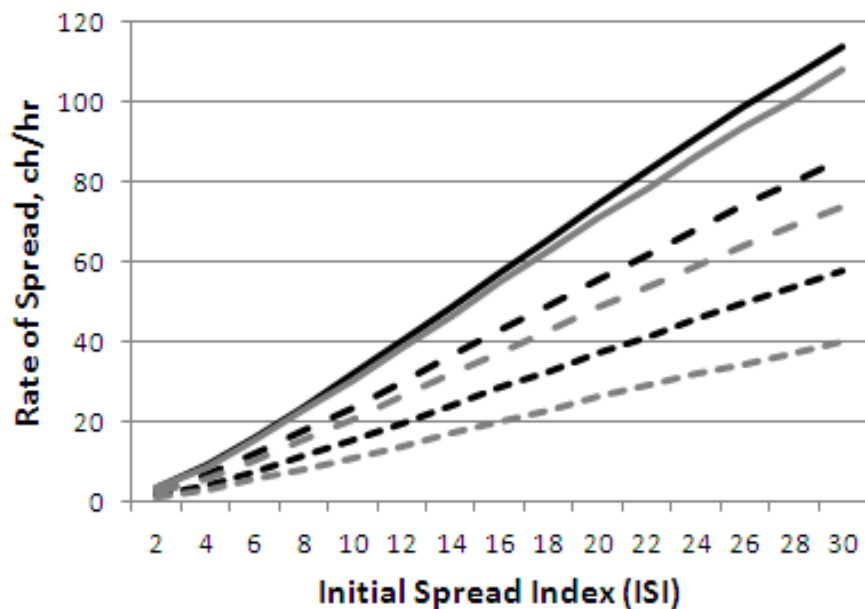
Average DMC & BUI Trends for Upper Yukon Valley Predictive Service Area



Seasonality in FBP Fuel Types

- Boreal Mixedwood (M-1 Leafless Hardwoods & M-2 Green Hardwoods)
- Deciduous (D-1 Leafless Aspen and D-2 Green Aspen)

Boreal Mixedwood



2.5.3 O-1b, Standing Grass

Open, Rate of Spread in ch/hr

Multiply by 1.1 to get feet/min

Divide by 80 to get miles/hour

Divide by 3 to get meters/min

Intensity Class		Flame Length	FLI kW/m	FLI BTU/ft/sec
1	up to	1	10	3
2	up to	4	500	145
3	up to	8	2000	578
4	up to	12	4000	1156
5	up to	18	10000	2891
6	> than	18	10000	2891

ISI	Degree of Curing (%)									
	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
1	0.0	0.0	0.1	0.1	0.2	0.5	1	1	2	2
2	0.0	0.1	0.2	0.4	0.8	2	3	5	6	8
3	0.1	0.2	0.4	0.8	1	3	6	9	12	15
4	0.1	0.3	0.6	1	2	5	9	14	19	23
5	0.1	0.4	0.9	2	3	7	13	20	27	33
6	0.2	0.5	1	2	4	9	18	26	35	44
7	0.2	0.7	1	3	6	11	22	33	45	56
8	0.3	0.8	2	4	7	14	27	41	54	68
9	0.3	1	2	4	8	16	32	48	64	81
10	0.4	1	2	5	9	19	38	56	75	94
11	0.5	1	3	6	11	21	43	64	86	107
12	0.5	1	3	6	12	24	48	73	97	121
13	0.6	2	4	7	14	27	54	81	108	135
14	0.6	2	4	8	15	30	59	89	119	149
15	0.7	2	4	9	16	33	65	98	130	163
16	0.7	2	5	9	18	35	71	106	141	177
17	0.8	2	5	10	19	38	76	114	153	191

- M1-25%
- - - M1-50%
- M1-75%
- M2-25%
- - - M2-50%
- M2-75%

Open Fuels (O-1a Matted Grass and O-1b Standing Grass) ask for a Degree of Curing as input instead of BUI.

What isn't in FWI and FBP?

- Snow Cover Factors across the state and at higher elevation terrain influence start to the season
- Seasonal variation in ignition potential related to greenup and curing
- Seasonal changes in Permafrost and Active Layer conditions that affect both dead and live fuels
- Plant Physiology Response to Daylength and temp/rh extremes for estimating the duration of active fire growth during the day
- Regional differences due to predominate vegetation and fuel conditions
- Climate Change

Snow Cover & FWI Calculations

Begin calculations on the third day after snow has essentially left the area to which the fire danger rating applies. Can Remote Sensing provide this answer real time spatially? Important if we calc FWI codes/indices graphically.



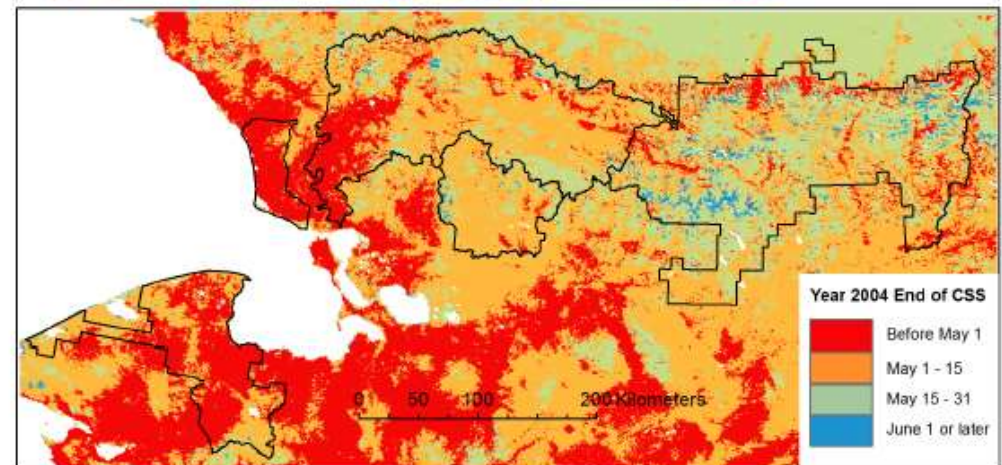
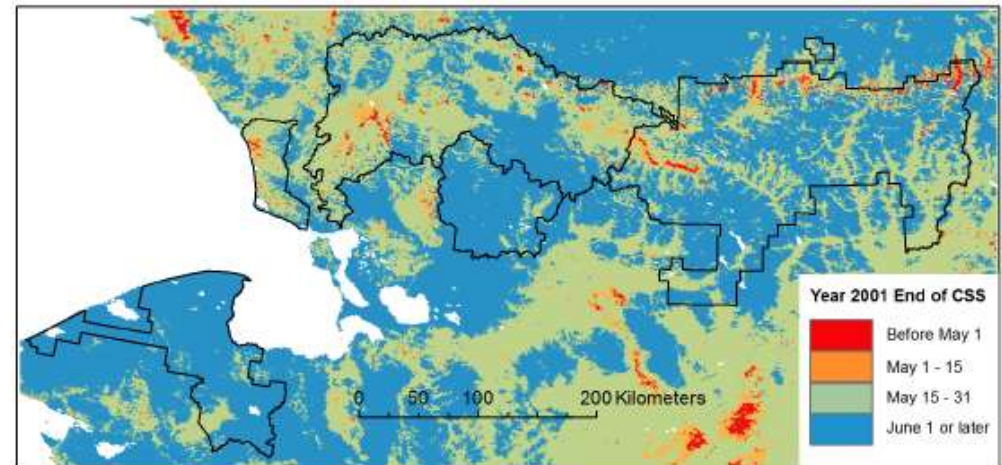
Can we see snow cover remotely?

- GINA and NPS collaborated on building MODIS data
- Numerous metrics available
- Can we use this to identify appropriate startup dates individual weather stations and management areas?



Snow Cover Monitoring with MODIS Satellite Data in the Arctic Inventory and Monitoring Network, Alaska, 2000-2013

Natural Resource Data Series NPS/ARC/NRDS—2014/634

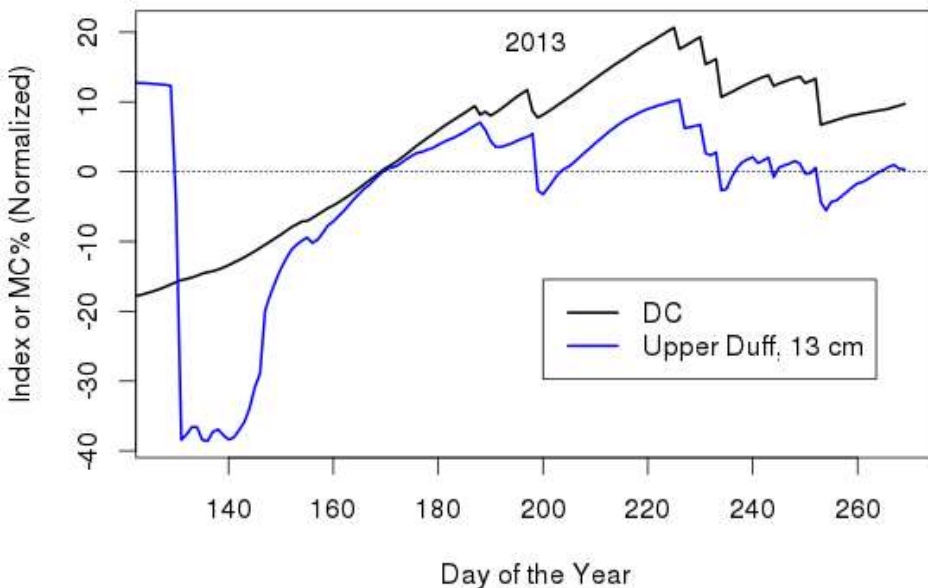
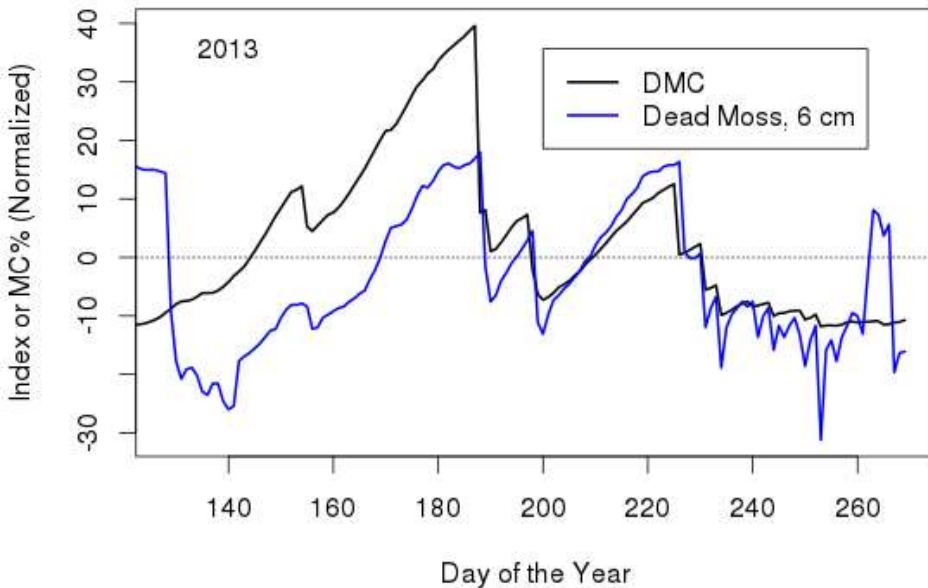


Snow Cover & FWI Calculations

- Calculations should be continued into the fall until snow covers the ground, or until the end of November
- Is there a reason to continue calculations thru winter?



Holmes Road Datalogger



Permafrost and Active Layer Moisture

- Is there a seasonal factor to fire danger related to moisture migration in the active layer?
- Could it affect the transition date winter to spring and spring to summer?
- Does it impact ignition, spread, intensity?

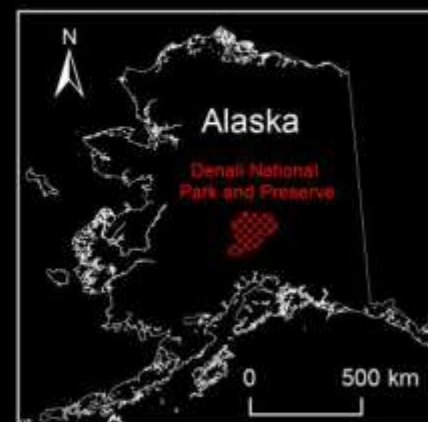
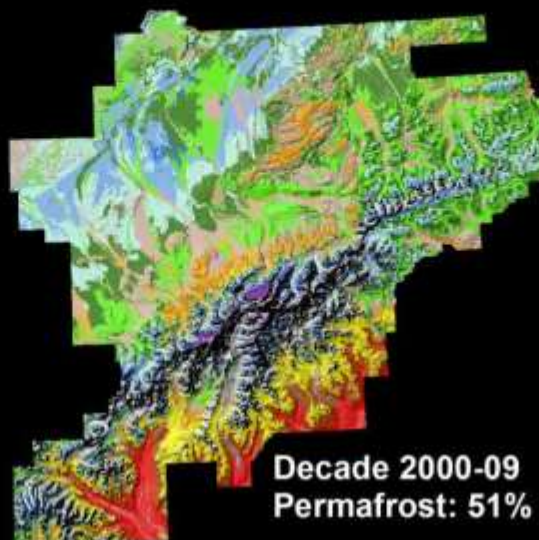
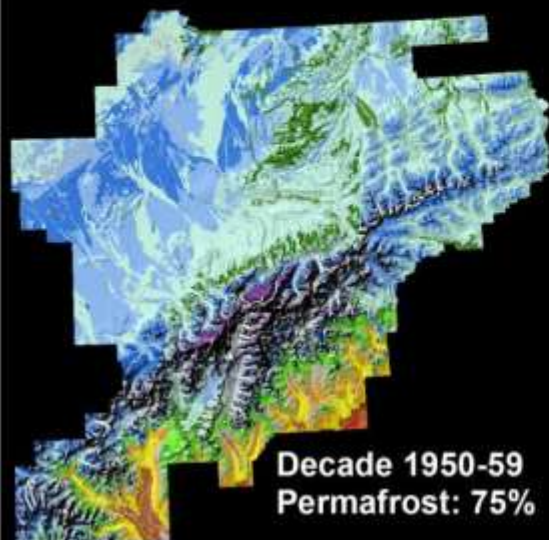




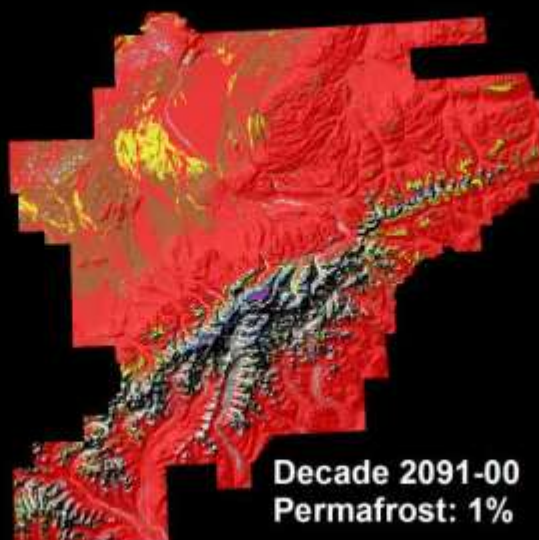
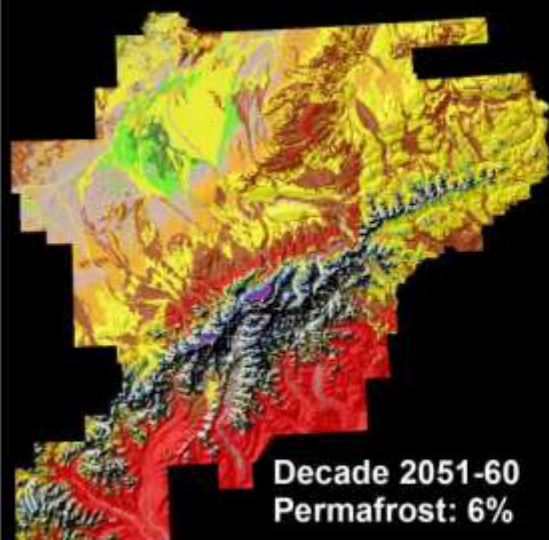




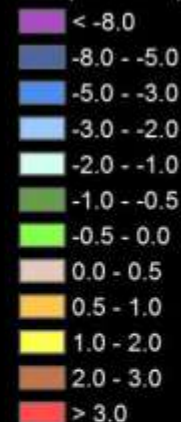
Decadal ground temperature at the bottom of seasonal freeze-thaw layer Denali National Park and Preserve, Alaska



0 50 100 km

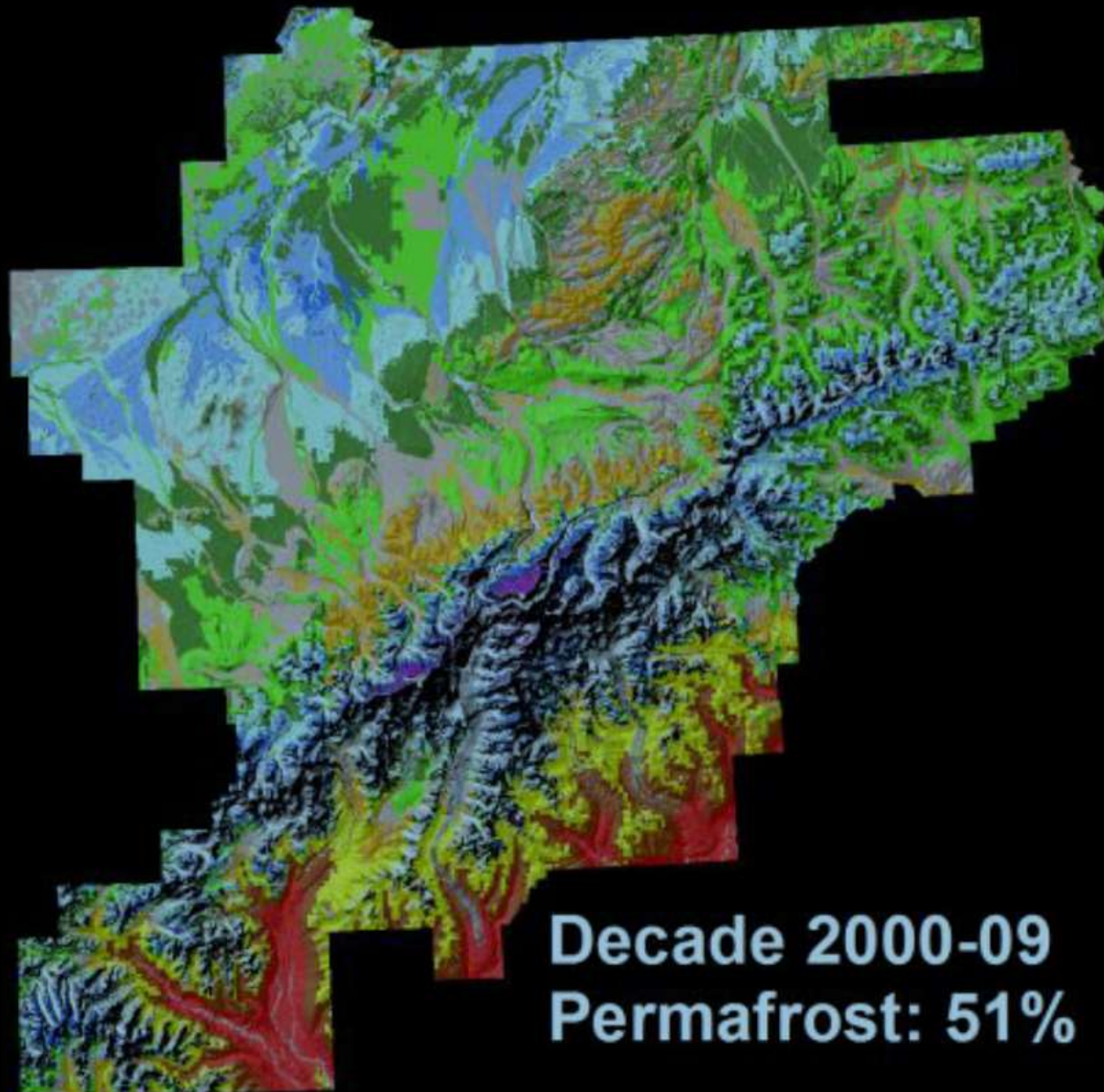


Temperature (C)

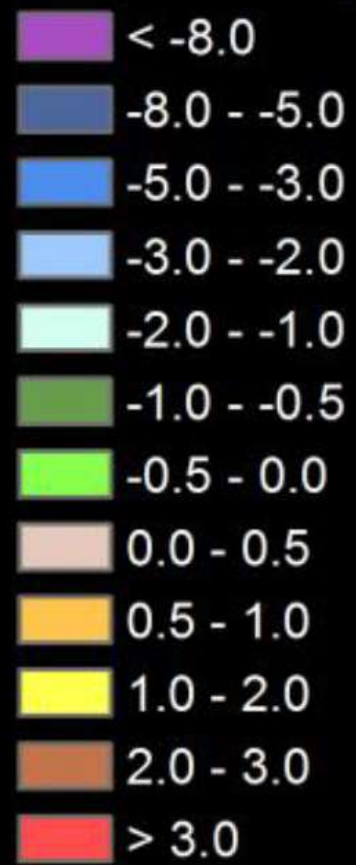


Hillshade Model





Temperature (C)



Decade 2000-09
Permafrost: 51%

Greenup and Growing Season Variation

- How do spring, summer, and fall fuel conditions affect fire potential (ignition, spread, and control difficulty)
- When does greenup begin? How long does it take? How does it affect fire potential?
- How do FWI and FBP account for the growing season?





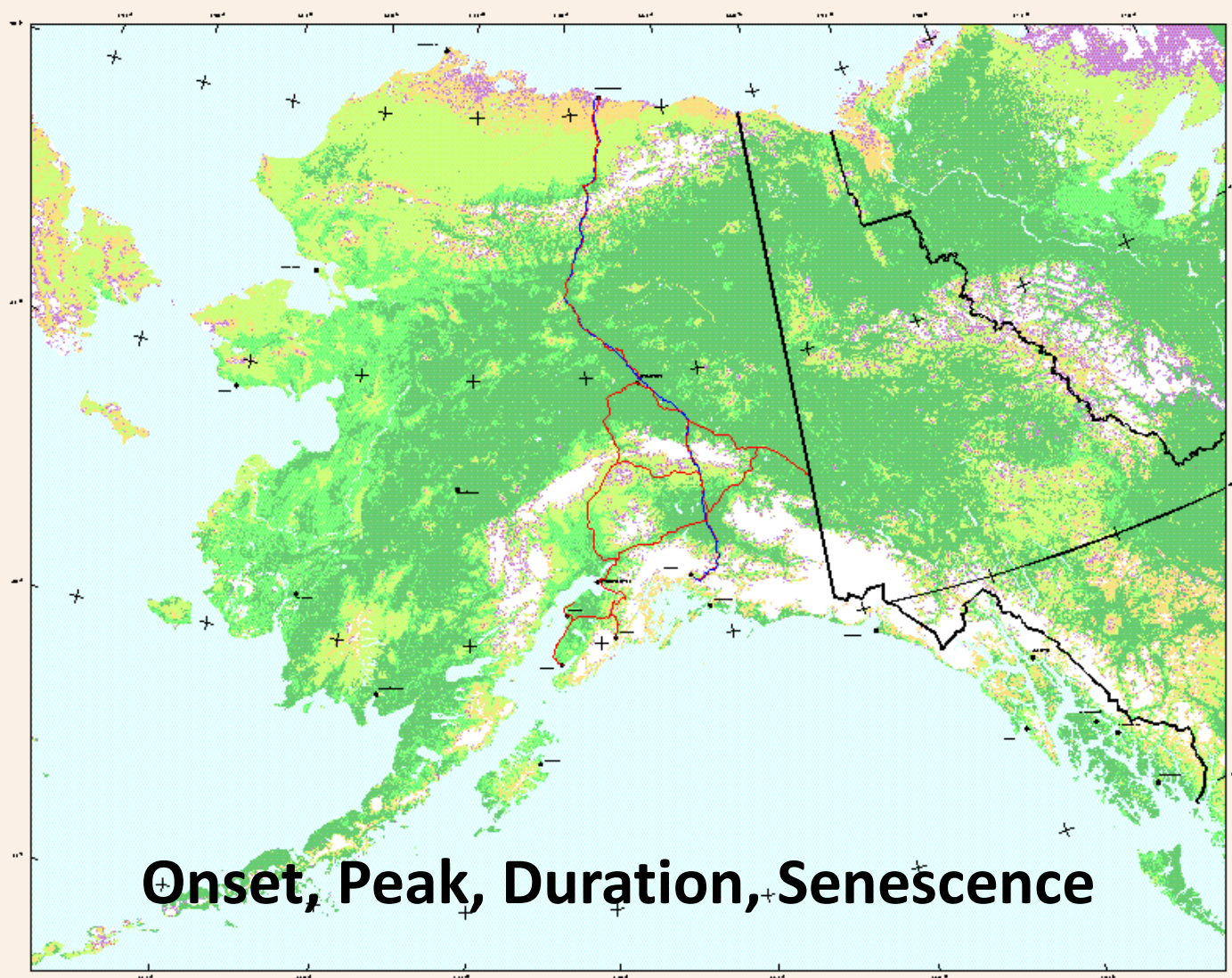








Alaska Land Characteristics Data Set - 1991 Duration Greenness



Data Source Imagery: NOAA-II AVHRR
Resolution: 1 kilometer

Multiple dates within a reporting period were merged to produce a composite image for that period. A composite image was built for each of 11 consecutive twice-monthly reporting periods, May 1st through October 15th. Patterns over multiple periods were analyzed to generate this product.

Duration refers to the number of days when the NDVI value reached or exceeded a threshold value (0.10) and is similar to the length of the growing season.

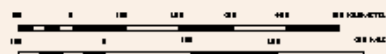
Note: This map was prepared under the U.S. Geological Survey Global Change Program, Land Data Systems - Arctic Land Process Studies. The information displayed is preliminary and has not been edited or reviewed for conformity with U.S. Geological Survey standards or nomenclature.

February 1994

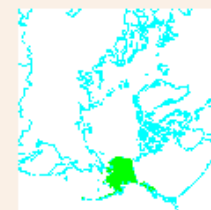
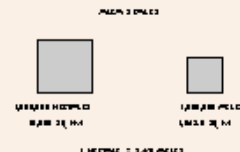
Onset, Peak, Duration, Senescence

U.S. GEOLOGICAL SURVEY
GLOBAL CHANGE PROGRAM
LAND DATA SYSTEMS - ARCTIC LAND PROCESS STUDIES
U.S. GEOLOGICAL SURVEY

ALASKA: GEOPHYSICAL RESEARCH
CENTRALIZED DATA CENTER
1700 UNIVERSITY AVENUE, SUITE 100
FAIRBANKS, ALASKA 99701-1000



— LOW-3
— PEAK-3
— PEAK-3/LOW-3 COMBINED
— PEAK-3/LOW-3 COMBINED

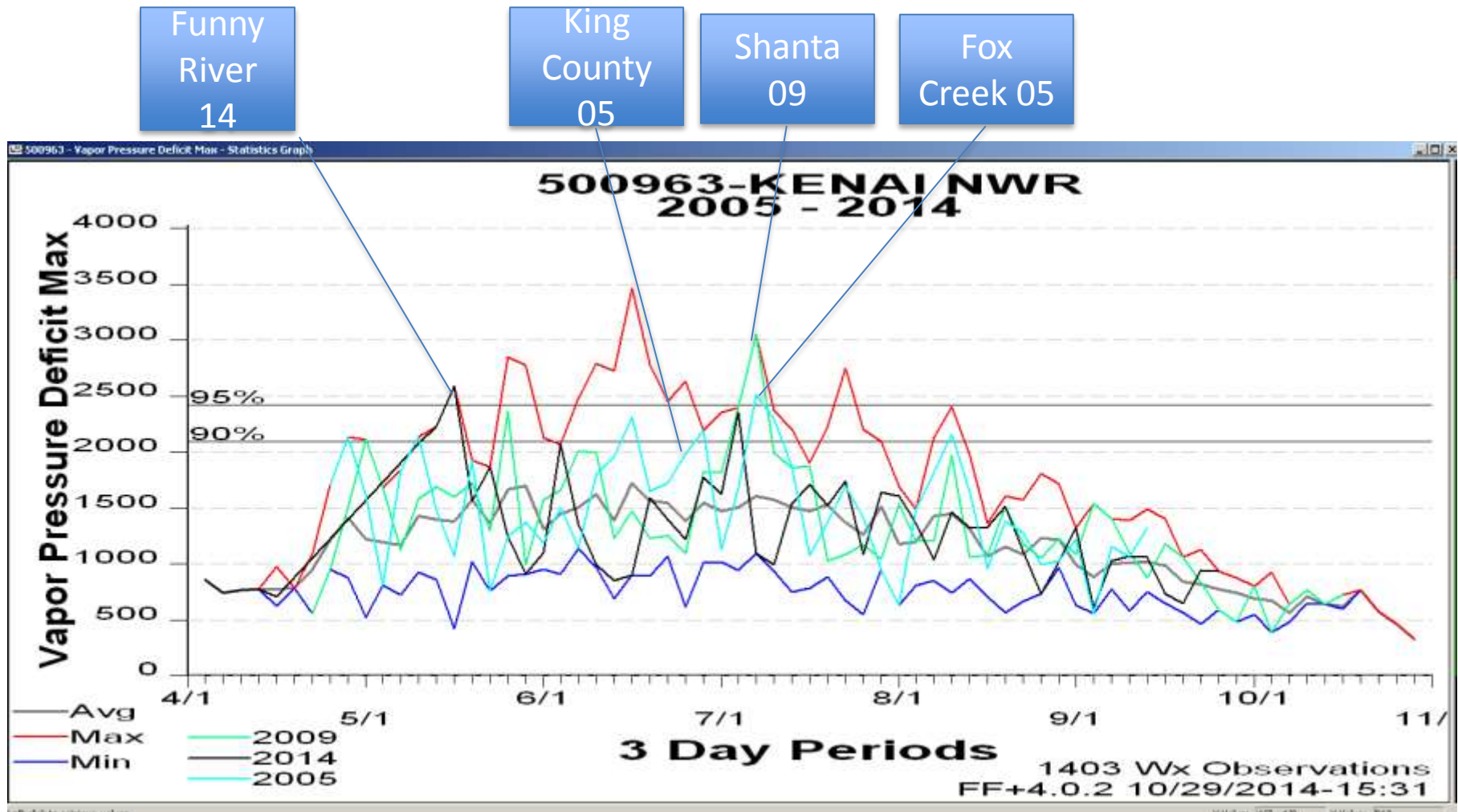


Day length / plant physiology

Seeing through the smoke

Image courtesy of
NASA

Day length / plant physiology



Day length / plant physiology

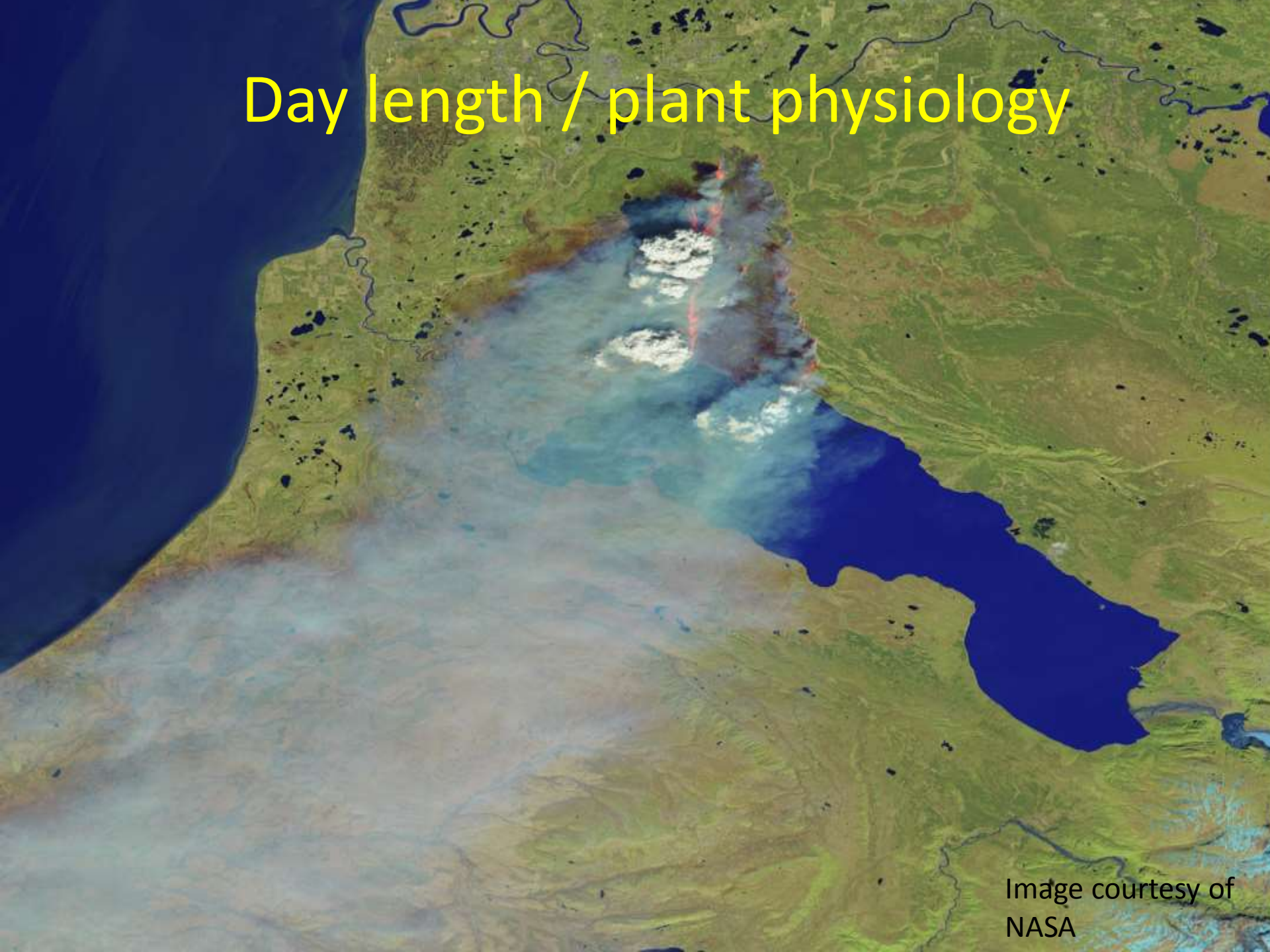
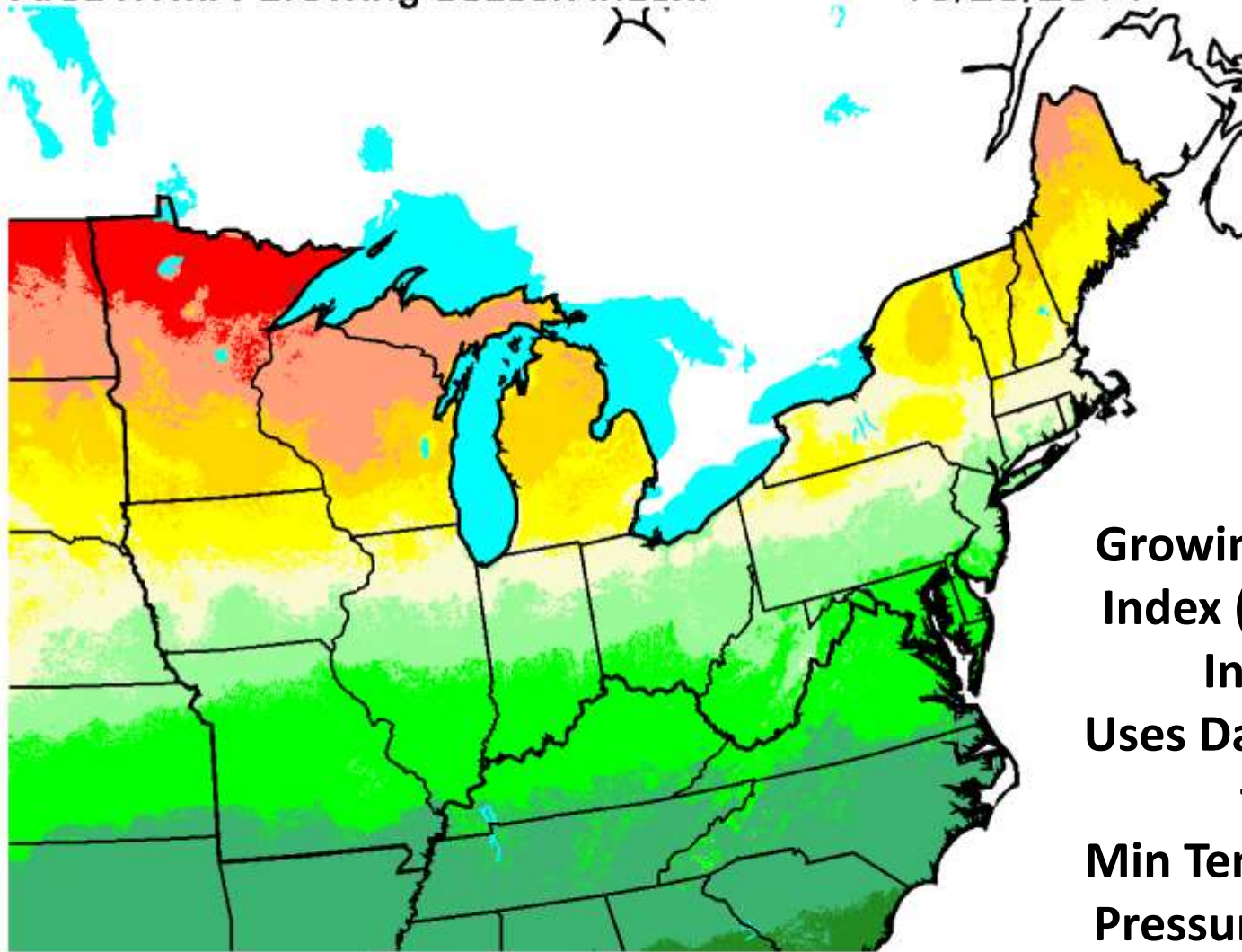


Image courtesy of
NASA

Eastern Area RTMA Growing Season Index:

10/28/2014



**Growing Season
Index (Live Fuel
Index)
Uses Daily values
for
Min Temp, Vapor
Pressure Deficit,
Daylength**

LEGEND

1-10%	41-50%	81-90%
11-20%	51-60%	>90%
21-30%	61-70%	Dormant
31-40%	71-80%	

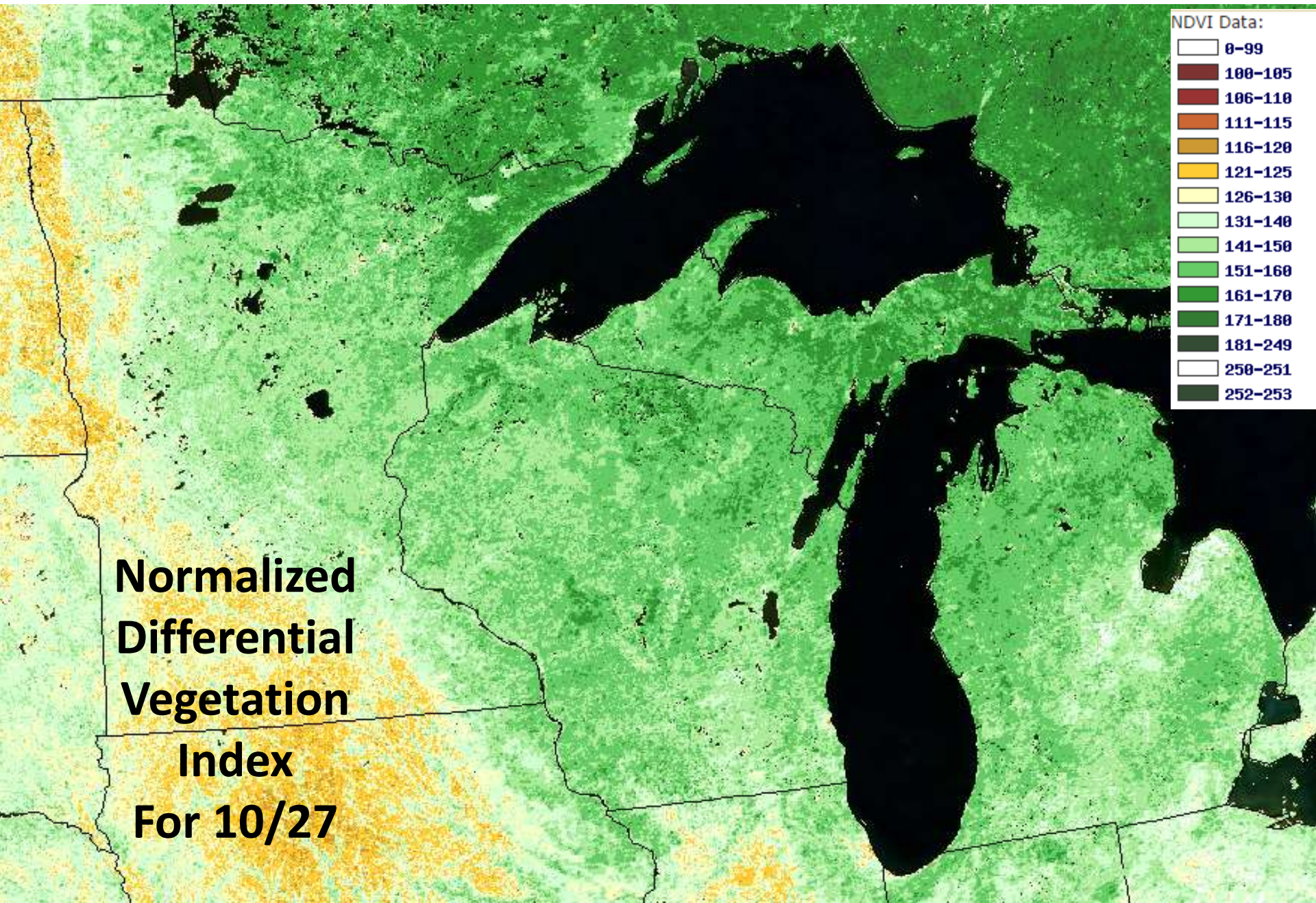
FireLab
MISSOULA, MONTANA



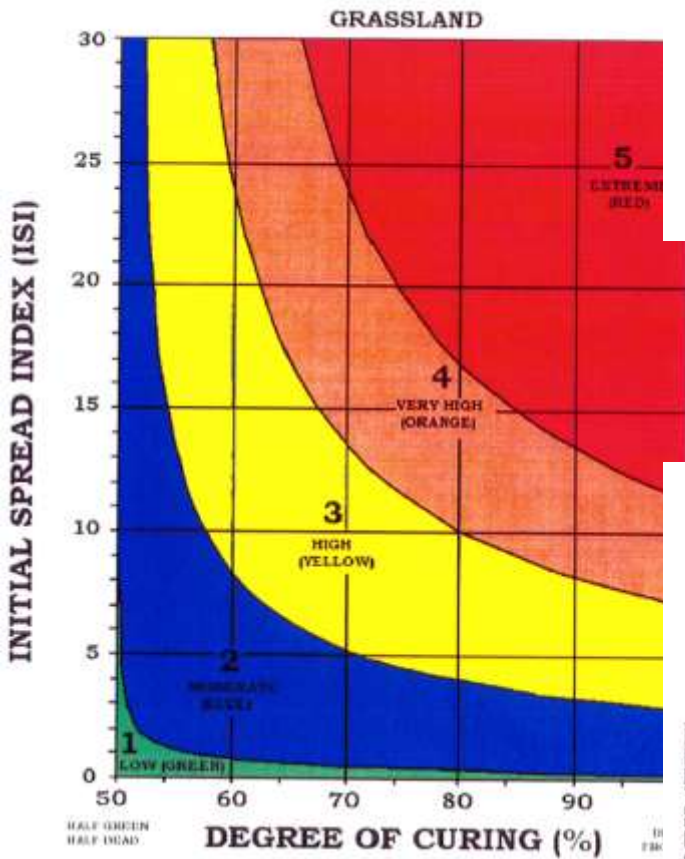
WFAS-MAPS National Interagency Fire Center



Can Remote Sensing answer this real time?



GRASS FIRE BEHAVIOR GUIDE

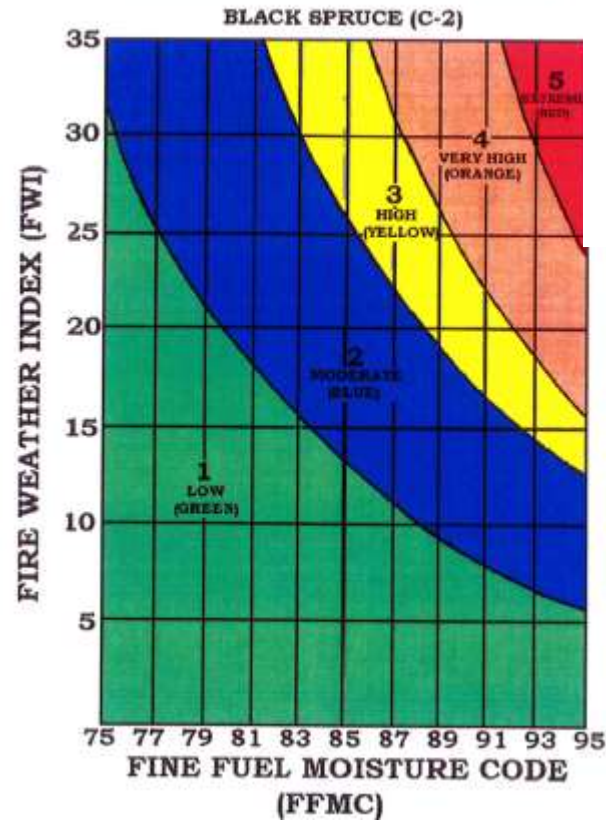


Pre-Green

Listen to Fire Managers

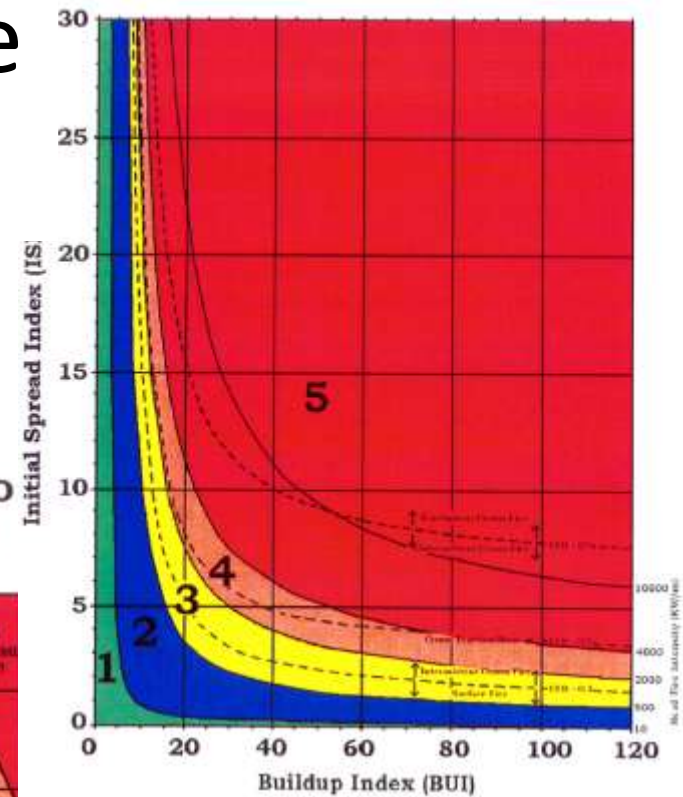
Greenup

FIRE BEHAVIOR GUIDE TO PREPAREDNESS LEVELS



HEAD FIRE INTENSITY CLASS GRAPH

For FBP System Fuel Type C-2 (Boreal Spruce)



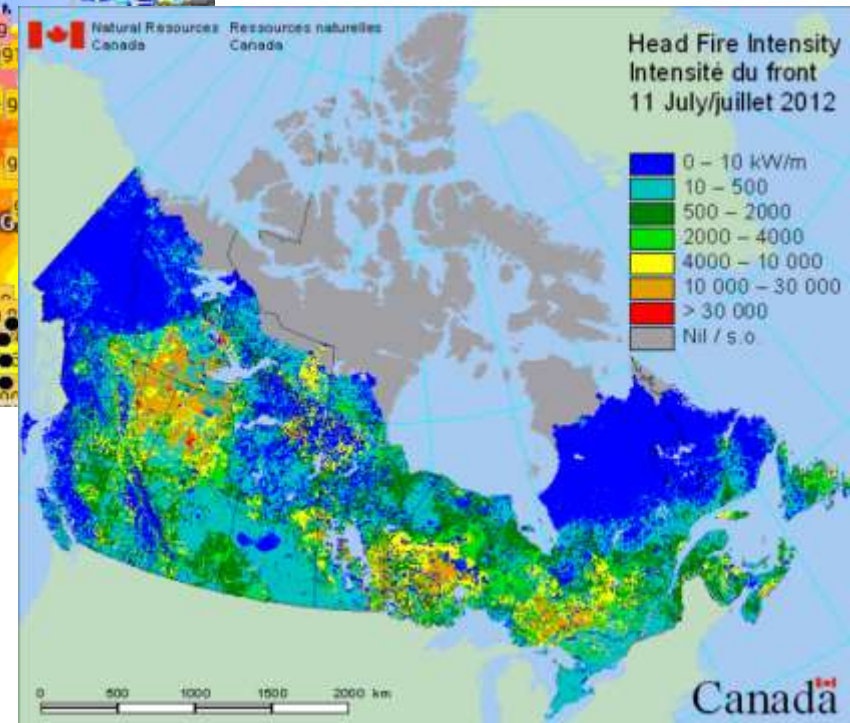
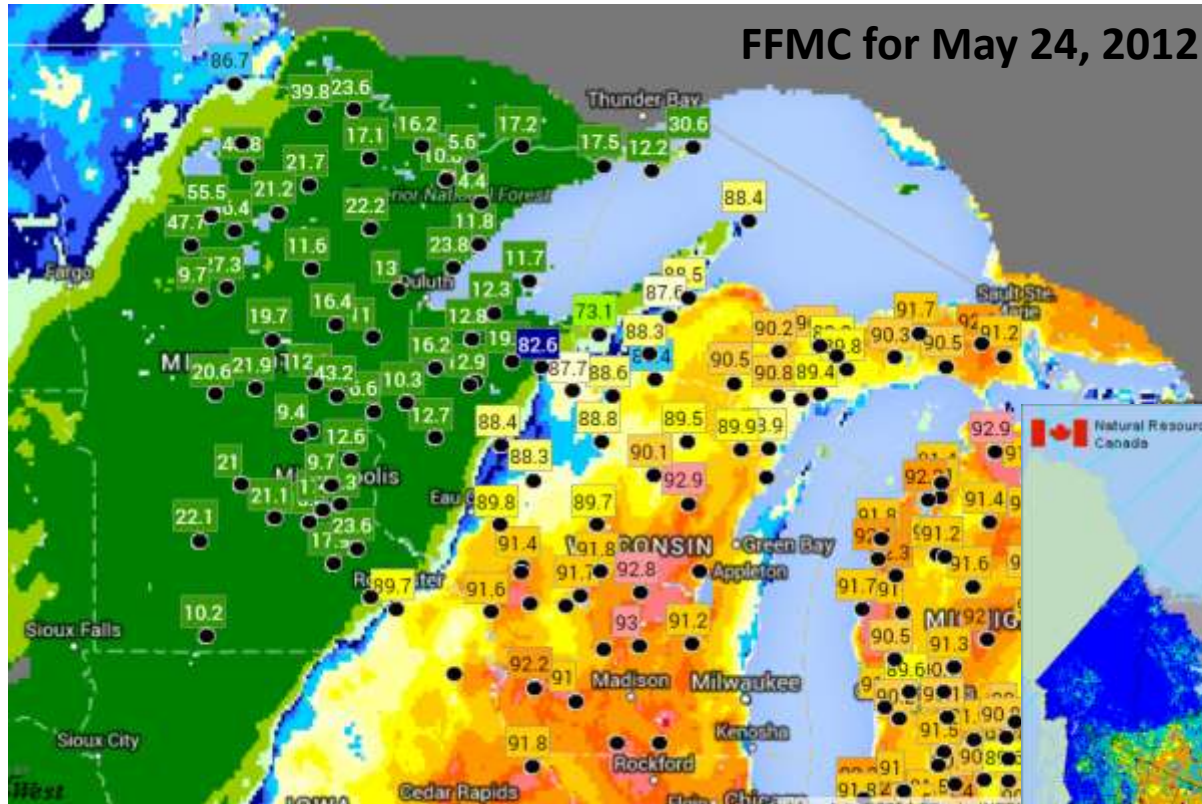
Growing Season

Fall?

Build tools for both Tactical and Strategic Decision-Makers

	LOW	MODERATE	HIGH	VERY HIGH	EXTREME
Pre-Green	ISI 0.0-2.0	ISI 2.0-8.0 FFMC <86	ISI 6.0-8.0 FFMC >=86	ISI >=8.0 FFMC <92.0 <i>Or</i> ISI >= 8.0 FWI < 36.0	FFMC 92.0+ FWI 36.0+
BUI 0.0-39.9	FFMC 0.0 85.9	FFMC 86.0-88.9	FFMC 89.0-92.9 <i>Or</i> FFMC 93.0+ ATF <80	FFMC 93.0+ ATF 80+ FWI <40.0	FFMC 93.0+ ATF 80+ FWI 40+
BUI 40.0-59.9	FFMC 0.0 83.9	FFMC 84.0 88.9	FFMC 89.0-92.9 <i>Or</i> FFMC 93.0+ ATF <75	FFMC 93.0+ ATF 75+ FWI <40.0	FFMC 93.0+ ATF 75+ FWI 40+
BUI 60.0-89.9	FFMC 0.0 83.9	FFMC 84.0-85.9	FFMC 86.0-89.9	FFMC 90.0-92.9 <i>Or</i> FFMC 93.0+ FWI <36.0	FFMC 93.0+ FWI 36.0+
BUI 90.0-109.9	FFMC 0.0 81.9	FFMC 82.0-85.9	FFMC 86.0-88.9	FFMC 89.0-91.9 <i>Or</i> FFMC 92.0+ FWI <36.0	FFMC 92.0+ FWI 36.0+
BUI 110.0 +	FFMC 0.0-79.9	FFMC 80.0-83.9	FFMC 84.0-88.9	FFMC 89.0-91.9 <i>Or</i> FFMC 92.0+ FWI <28	FFMC 92.0+ FWI 28.0+

Take Advantage of Remote Sensing and Spatial Analysis



Keep An Eye on the Future

